HF Jet Tagging: DCA counting

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Outline

Changes:

- Simulation:
  - Jets pT → 20GeV
  - PDF → CTEQ6L, NLO alpha_s(M_Z) = 0.1180.
- Reco, MIE, MAPS+TPC, MAPS+IT+TPC
  - Tony's macros: https://github.com/adfrawley/macros/tree/QTG_macros

- Analysis:
  - track_quality < 1.0
  - Max_DCA_Cut → 0.1 cm
  - Max_S_Cut → 10

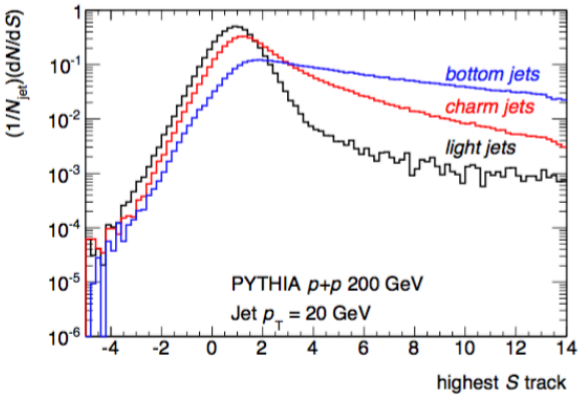
- Wiki: https://wiki.bnl.gov/sPHENIX/index.php/HF-Jet/Track_counting_tagger

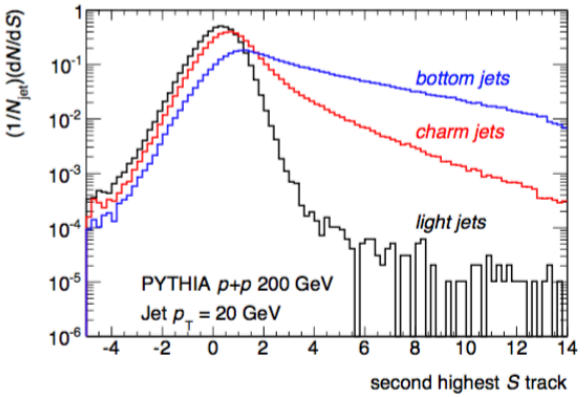
- Ana Code: analysis/HF-Jet/HighDCATrackCounting

S_DCA distribution

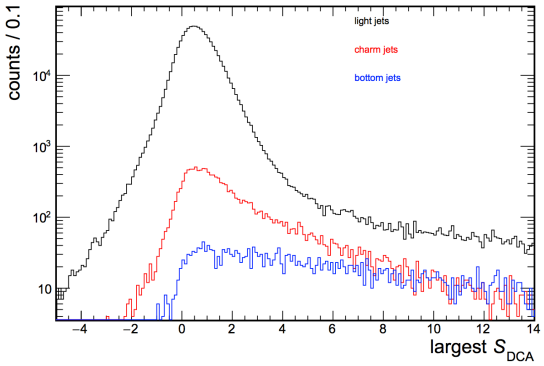
non-normalized,
3 separate simulations

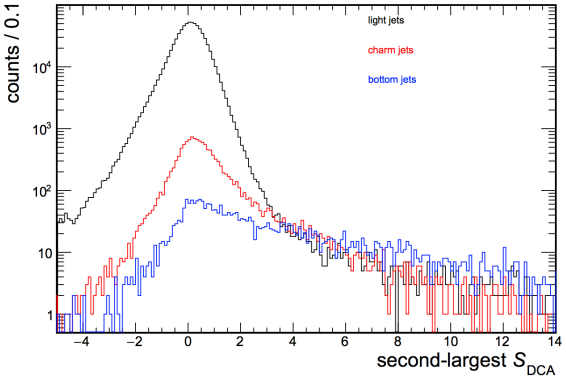
Fig. 42 of 1501.06197

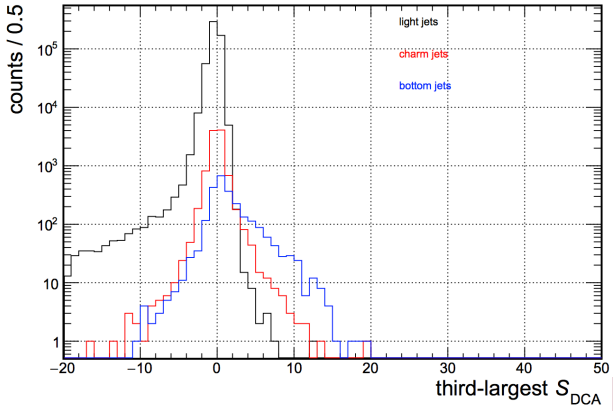




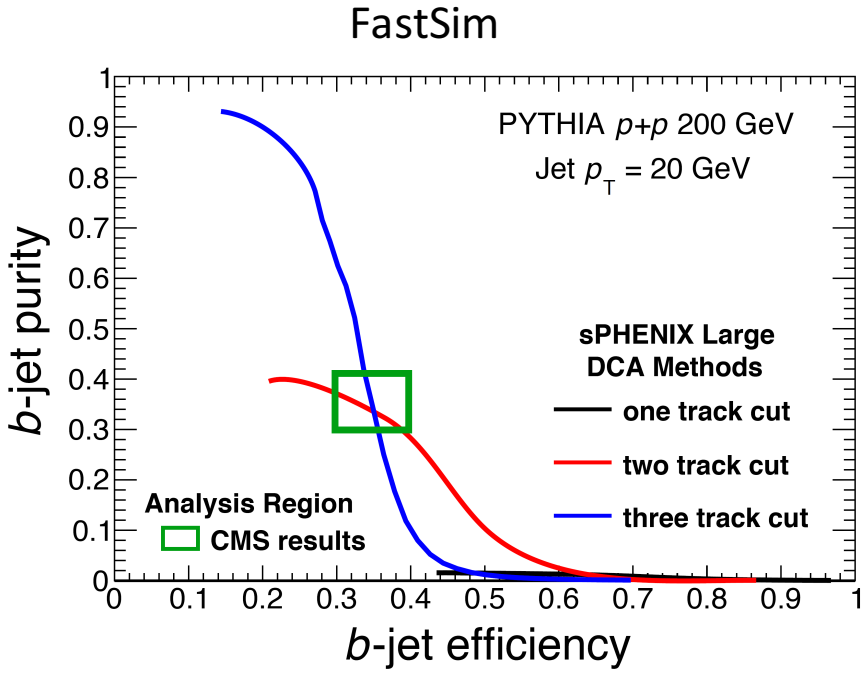
Pythia 8, HardQCD::all
Direct output
Tagged using Jin's flavor tagger.
DCA reco'd using MIE setup

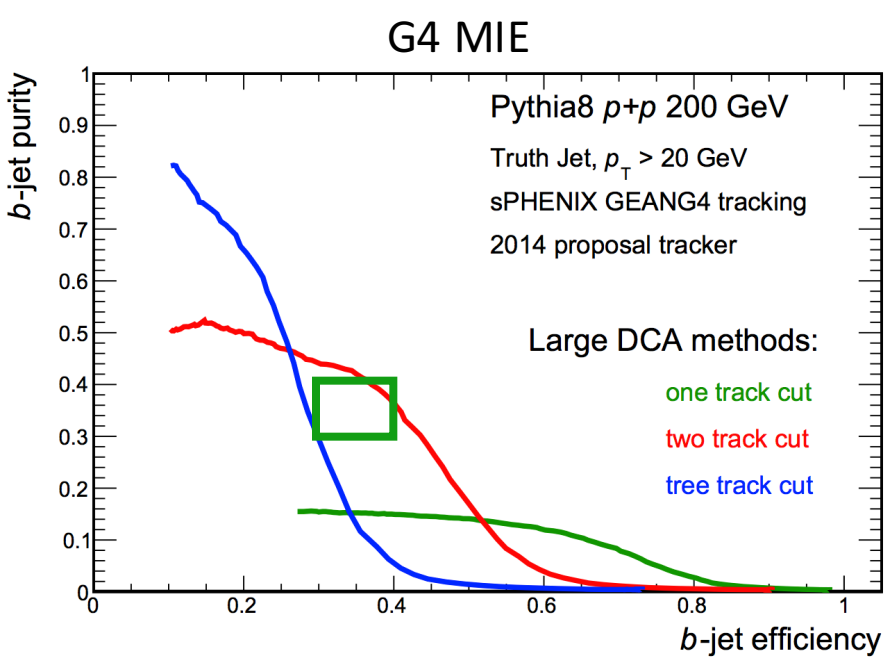






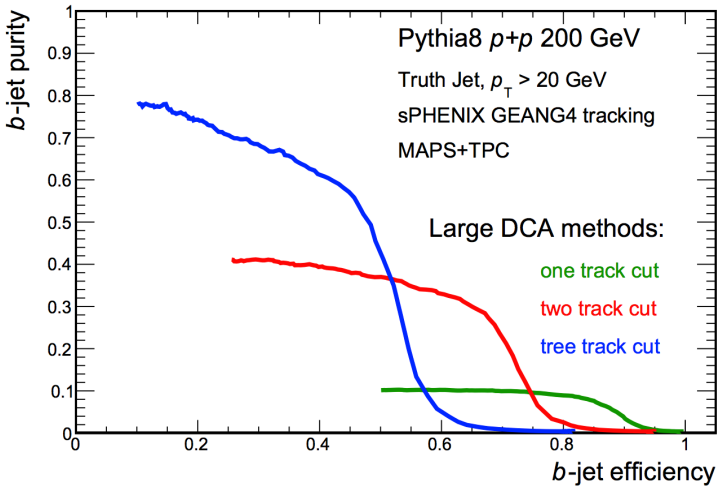
Results MIE


FastSim
PYTHIA p+p 200 GeV
Jet p_T = 20 GeV
sPHENIX Large DCA Methods
one track cut
two track cut
three track cut
Analysis Region
CMS results
b-jet purity
b-jet efficiency

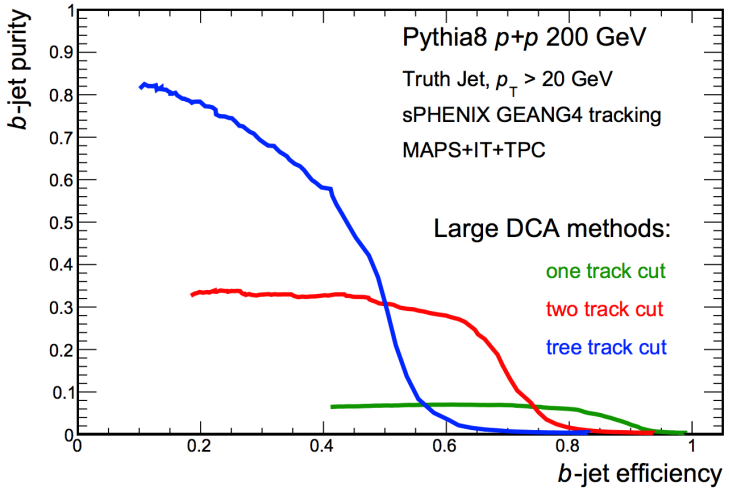

G4 MIE
Pythia8 p+p 200 GeV
Truth Jet, p_T > 20 GeV
sPHENIX GEANG4 tracking
2014 proposal tracker
Large DCA methods:
one track cut
two track cut
tree track cut
b-jet purity
b-jet efficiency

MAPS+TPC, MAPS+IT+TPC

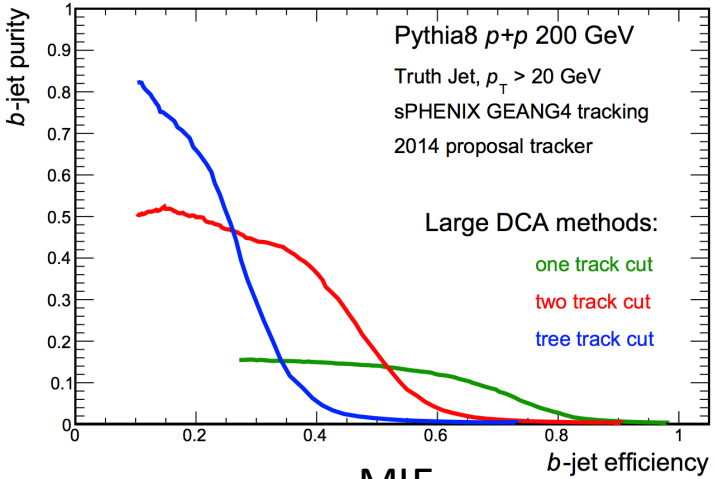
MAPS+TPC



MAPS+IT+TPC



- Similar performance between w/ and w/o IT
- Slight better performance w/o IT, especially for 1-track, 2-track methods.

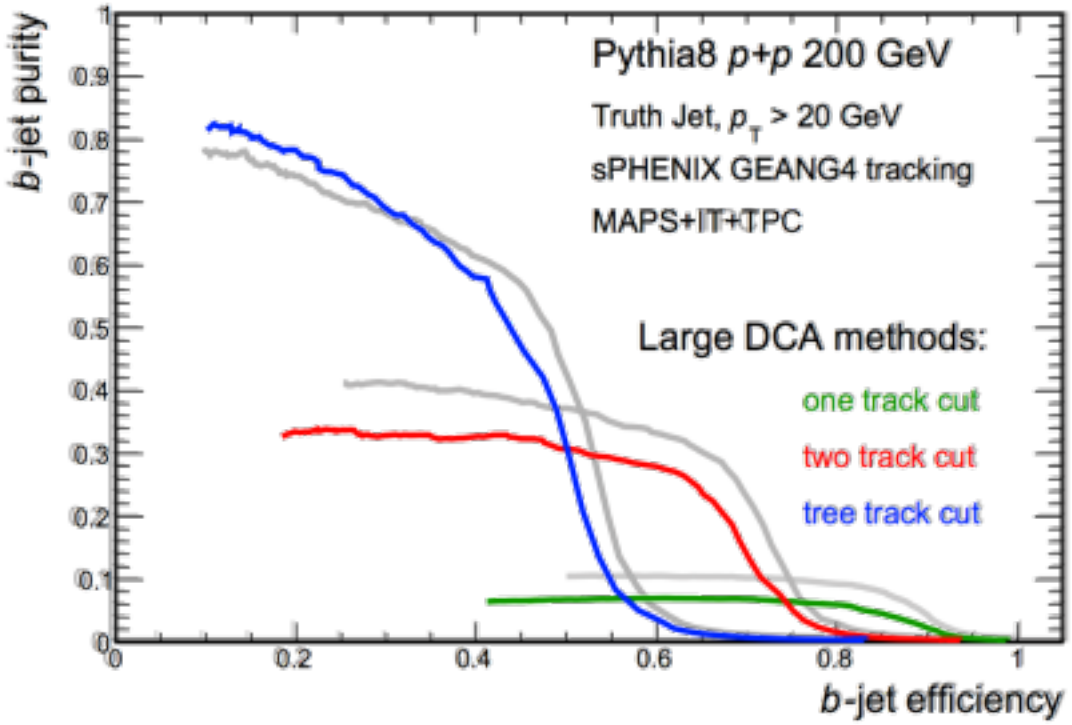


MIE

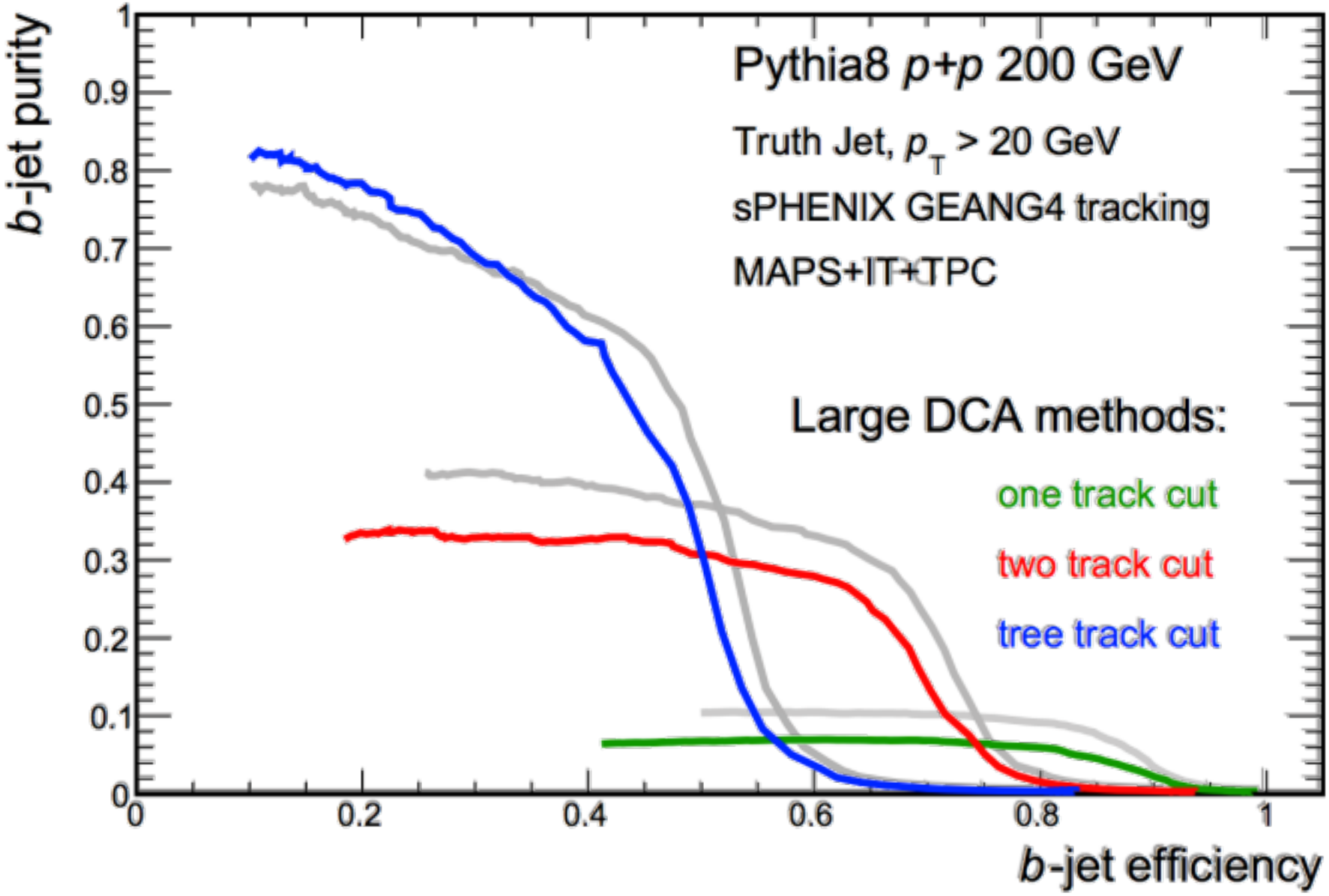
Difference between w/ and w/o IT

To figure out this, I make some quick and dirty overlay comparisons.
For the next several slides with overlays:

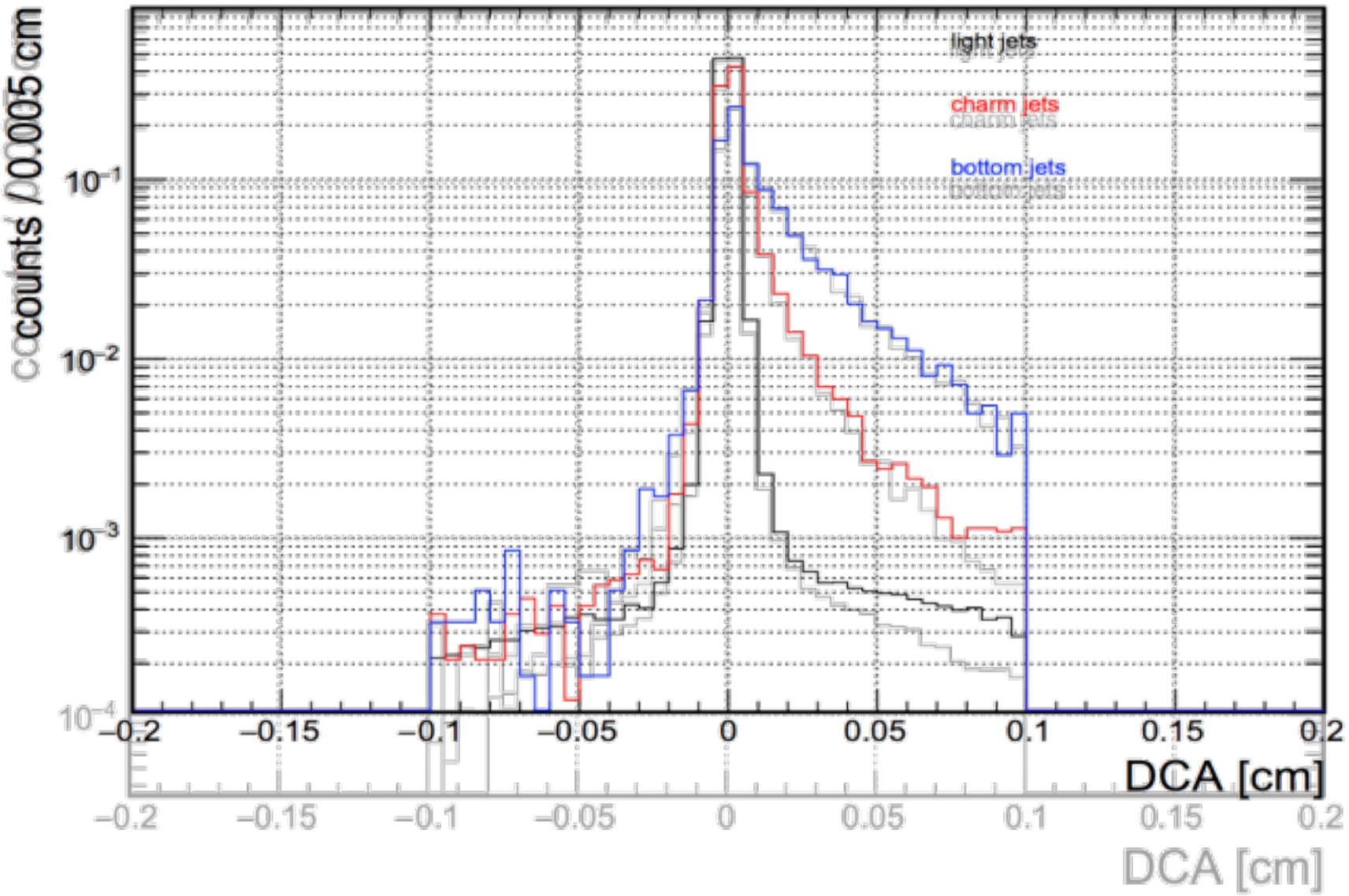
- The MAPS+TPC are Grey Curves in the background,
- The MAPS+IT+TPC are Colored Curves in the foreground.
- For instance, the overlay of the purity vs. efficiency plot:



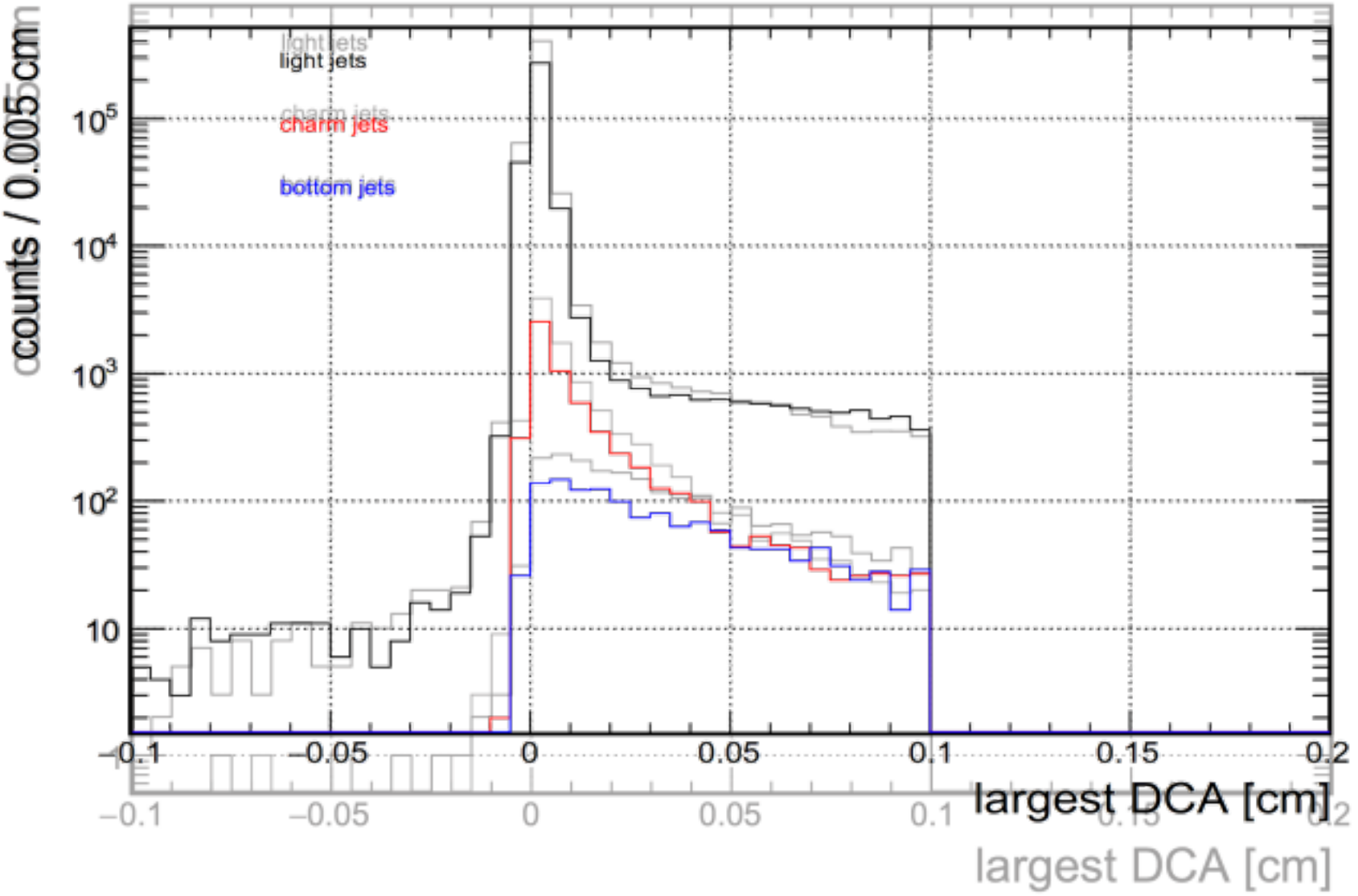
MAPS+TPC, MAPS+IT+TPC Overlay



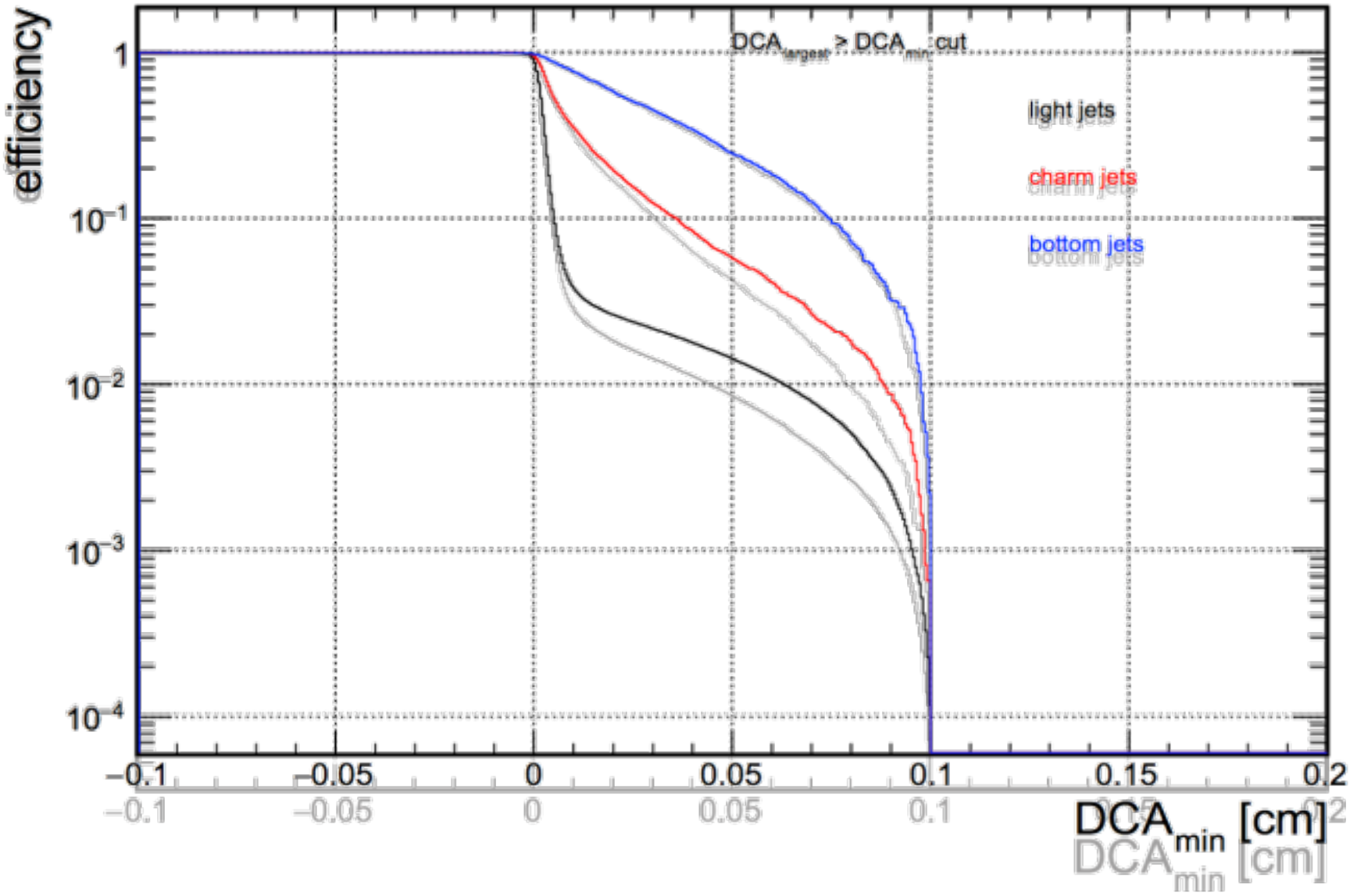
DCA distribution overlay



Largest DCA overlay



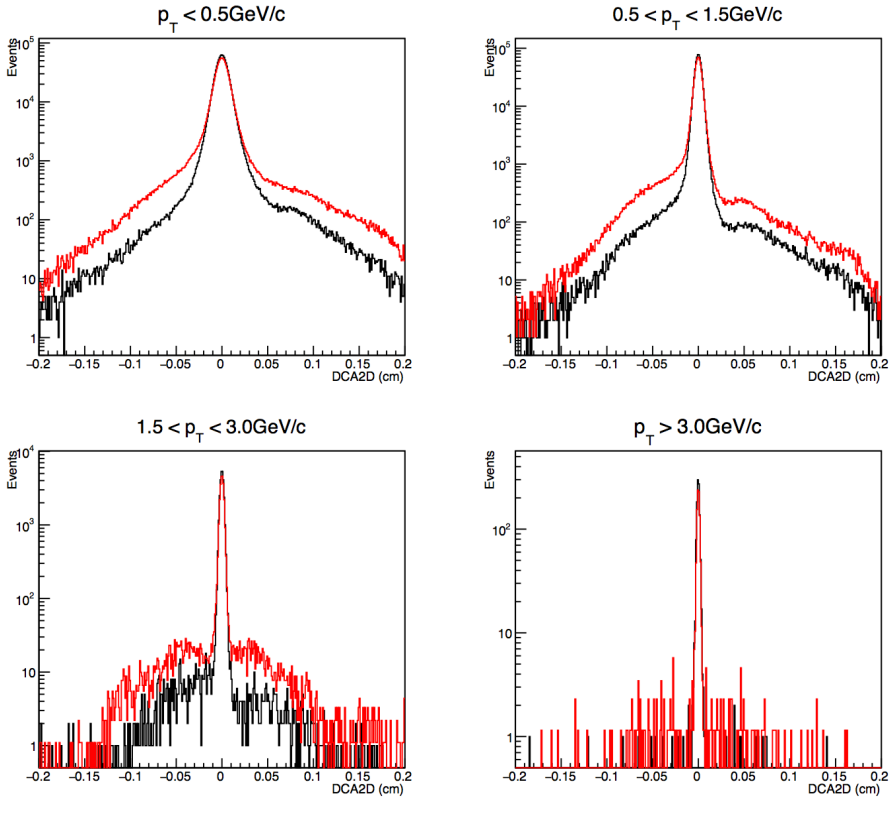
DCA performance: 1-track



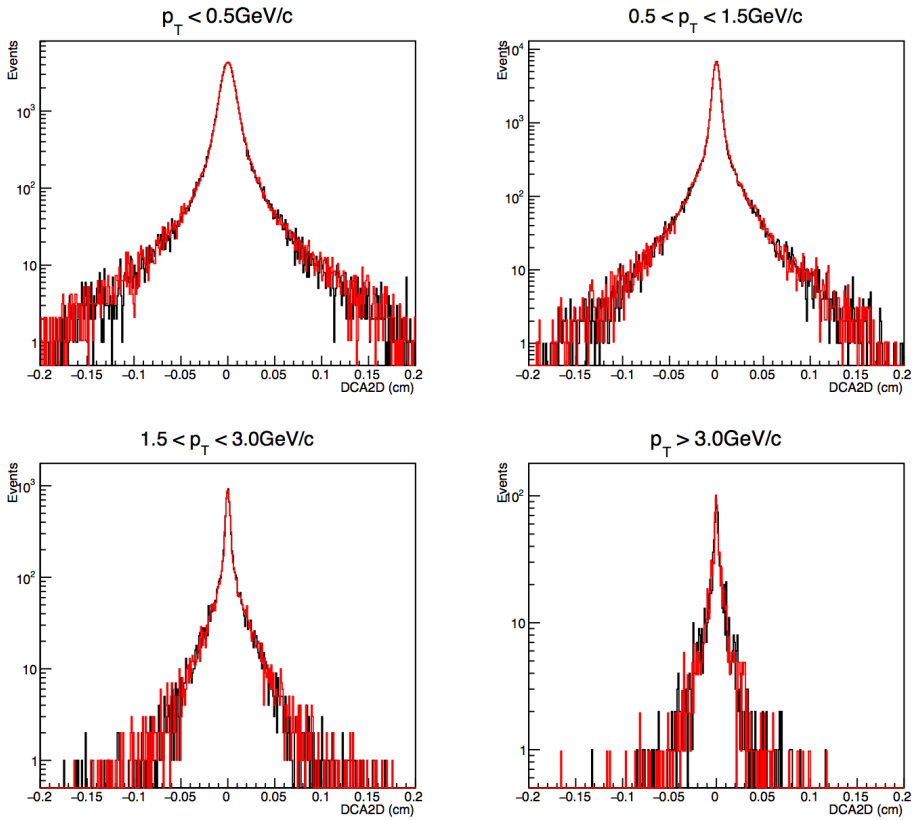
IT performance from Gaku's talk

Gaku's Aug. 26 Talk on the INTT:

Cnetral HIJING



Pythia 8, bb-bar



Backups:

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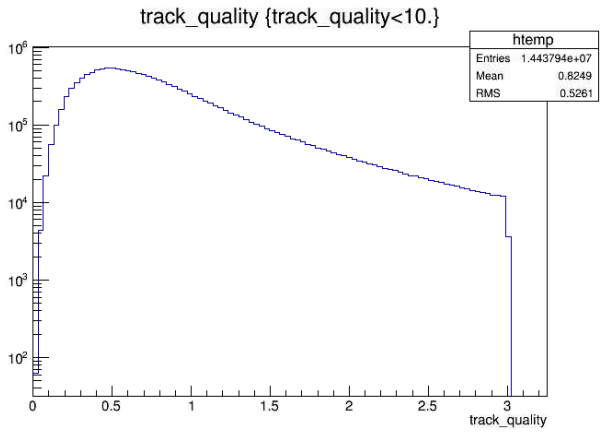
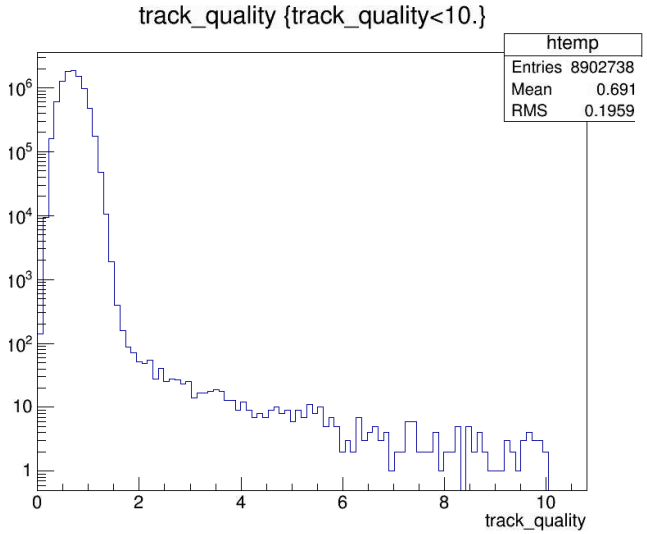
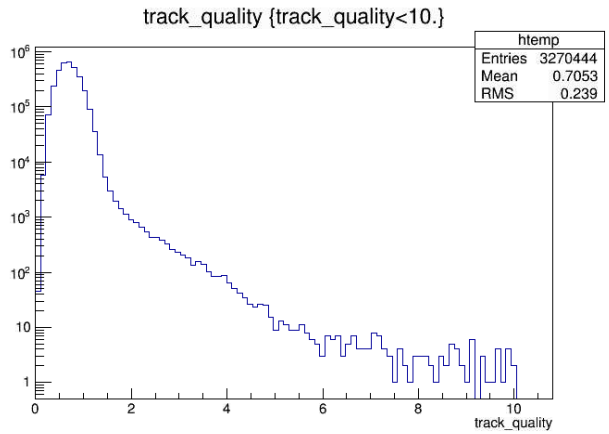
MAPS+TPC

MAPS+IT+TPC

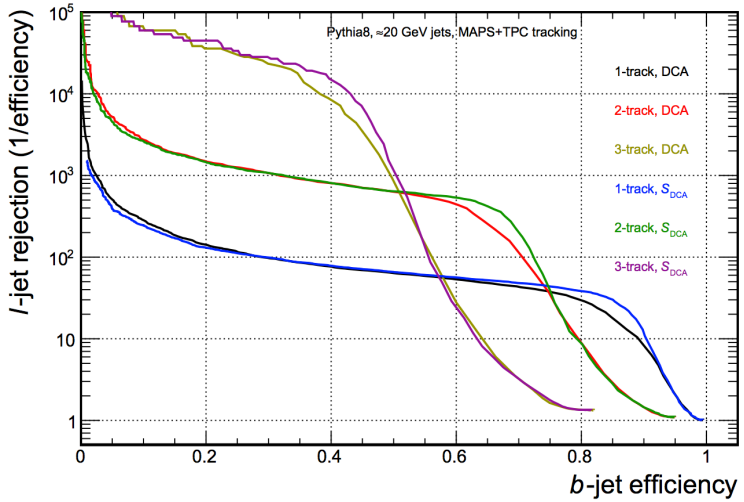




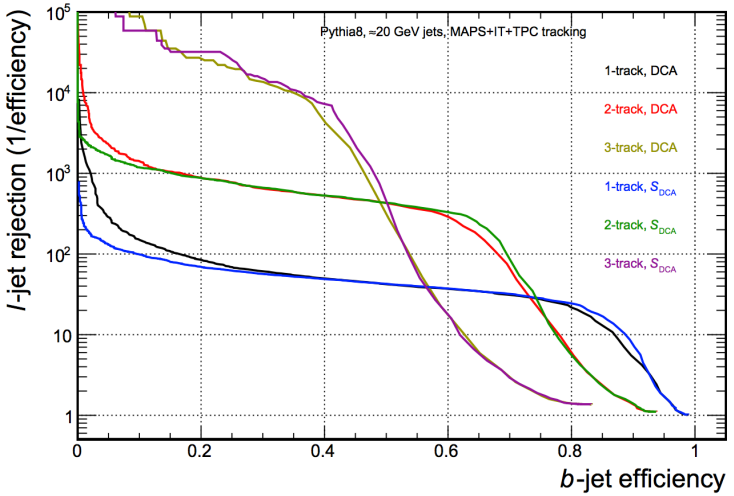


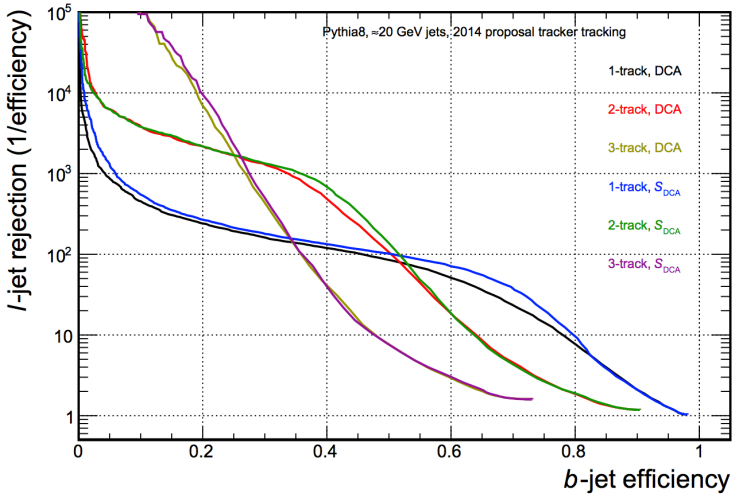
MAPS+TPC, MAPS+IT+TPC

MAPS+TPC



MAPS+IT+TPC





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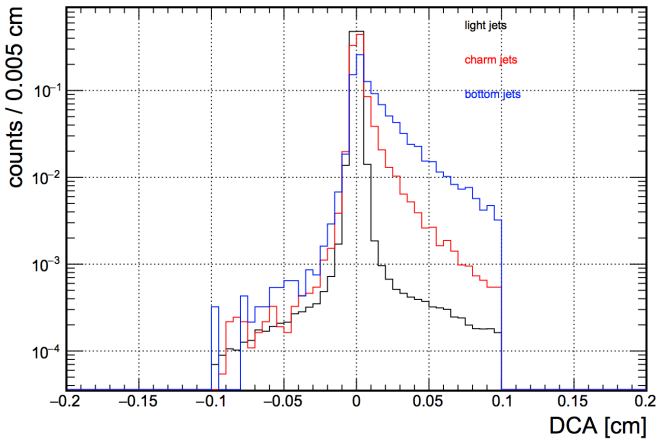
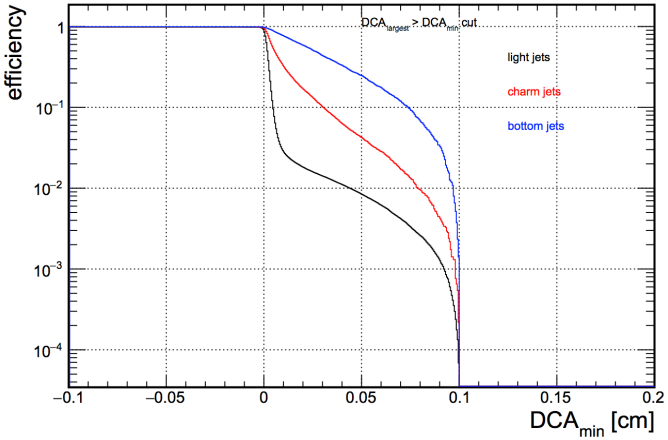
DCA performance

Inclusive DCA

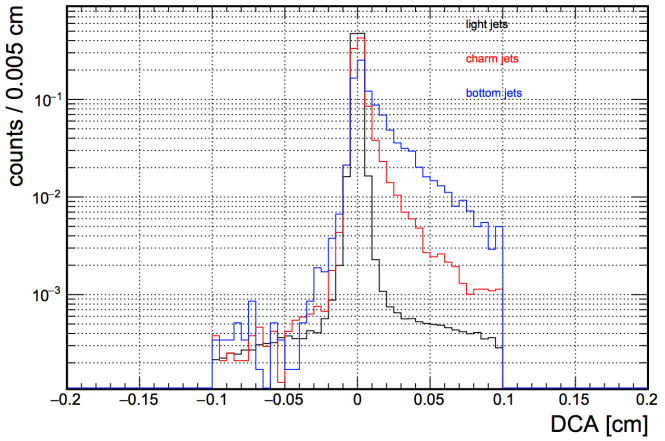
Largest DCA cut, efficiency vs. DCAmin Cut

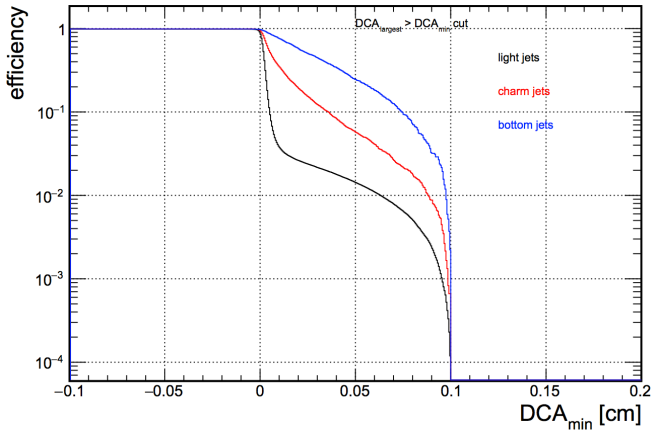
MAPS+TPC





MAPS+IT+TPC



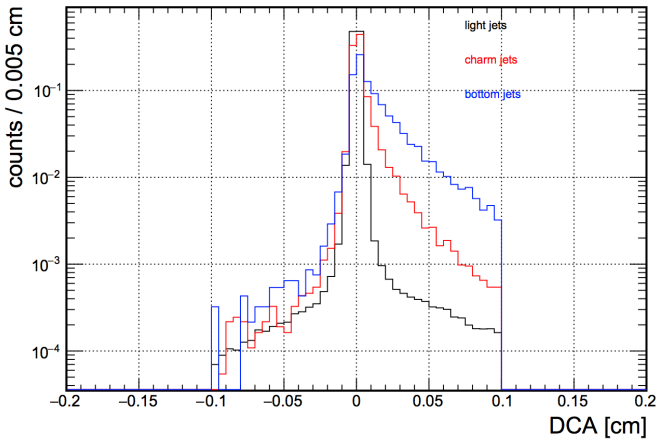


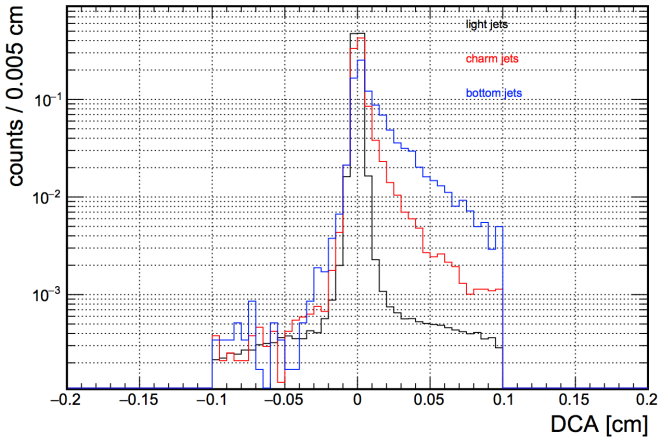
S performance

MAPS+TPC

MAPS+IT+TPC

Inclusive DCA





Largest S cut,
efficiency vs. Smin Cut